Protein Profits in the Market Place -- Watch for the Signals [1]

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Introduction

Where can wheat farmers and agronomists find information to project protein premiums? In order to help answer this question, this paper will:

- direct readers toward sources of protein premium projections for wheat, specifically Canada Western Red Spring (CWRS) and Canada Western Amber Durum (CWAD) wheat [4],
- discuss the factors that drive these protein premium projections,
- evaluate the accuracy of such projections in previous years, and
- suggest ways in which this information might be accessed for on-farm protein management decisions.

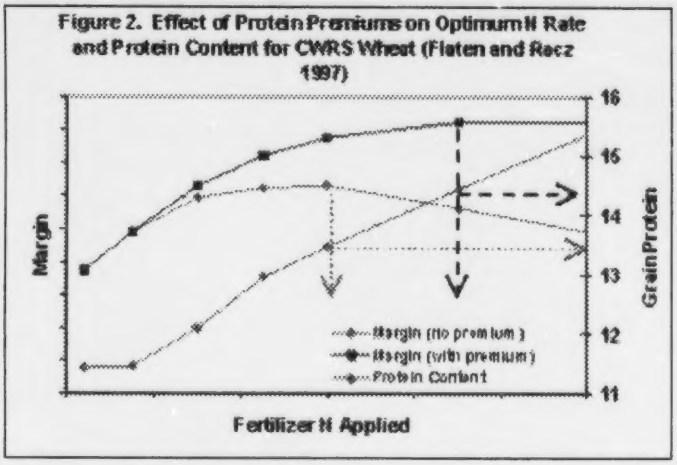
Background information is provided to explain the increasing importance of this topic, as are suggestions for further research.

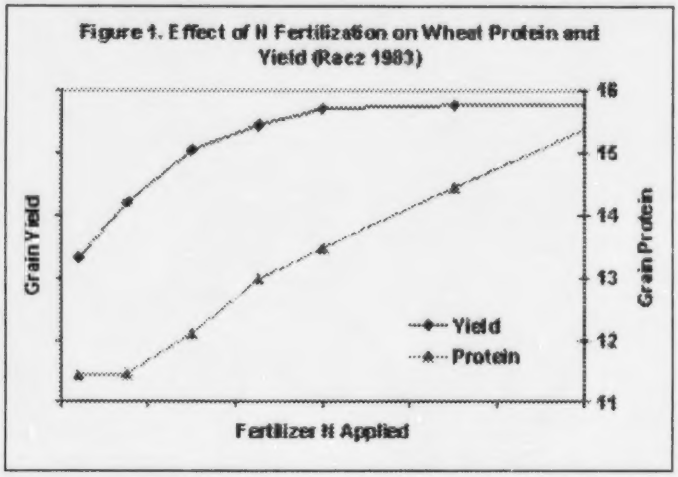
The Influence of Agronomic Practices on Wheat Protein Content

Agronomic management practices such as variety selection and nitrogen fertilization interact with weather conditions such as growing season temperature and water supply to play major roles in determining grain protein concentrations (Grant and Flaten 1998, Selles and Zentner 1998). The role of agronomic management relative to weather conditions is sometimes regarded as relatively small. However, protein formation cannot occur without nitrogen and, therefore, N fertilization provides farmers with a powerful tool to raise protein content. At low rates of N fertilization, additional N increases yield more than protein; at moderate rates of N, additional N increases both yield & protein; at high rates of N, additional N increases protein more than yield (Figure 1).

For example, Manitoba grain producers apply approximately 60% more N fertilizer per acre than producers in Saskatchewan and 33% more than those in Alberta (Roberts et al. 1998). As a result, Manitoba's protein concentrations for CWRS wheat have generally been higher than those in Saskatchewan and Alberta during the last 25 years.

Generally, fertilizing Western Canadian cultivars of wheat for optimum yield will also result in satisfactory protein content. For example, CWRS wheat typically contains at least 13.5% protein when adequately fertilized for optimum economic yield (Grant and Flaten 1998). A wheat producer's decision on whether to apply additional N fertilizer depends greatly on the size of the protein premium that is expected. When protein premiums are high relative to the base price for wheat, there is an economic incentive to fertilize for high protein, in addition to high yield. Under such conditions, a protein goal greater than 13.5% and a higher rate of fertilizer N may be profitable (Figure 2, Flaten and Racz 1997).





However, in recent years, except for 1993/94, the economic incentive to apply additional N fertilizer for the protein premium, alone, has been modest (Smith et al. 1998).

The agronomic risks associated with applying high rates of N fertilizer to raise protein concentrations are important to consider. The effect of N fertilizer rate on grain yield and protein content varies from one field to another, depending on nitrogen dynamics in the soil and yield limiting factors such as moisture supplies and pests. Also, overall grades must be high; significant premiums apply only to the top grades of certain classes of wheat. The risk of environmental impacts may also be significant when high rates of N are applied. Excess N may accumulate as nitrate, increasing the risk of nitrate leaching into ground water and production of greenhouse gases that accelerate global warming. The economic risk of fertilizing for protein, over and above yield, is also large. One of the greatest economic challenges associated with fertilizing wheat for protein is that the high costs of fertilization must be incurred when base prices and protein premiums for the new crop are uncertain.

Why is Higher Protein Worth More Money?

Protein content in wheat is valuable for two main reasons. First, the average protein content of the flour being used has an important impact on the quality of the processed product, and flour protein content is directly related to the protein content of the wheat being milled. The second source of value for protein is in blending. Various bins of wheat with different protein contents might be blended prior to milling in order to achieve a desired average. Alternatively, the flours milled from different lots of wheat might be blended together. Higher protein wheat helps to increase the average protein content of the blend, which often includes locally produced and/or cheaper lower protein wheat. Blending also occurs while wheat is being handled (e.g. in primary elevators in Canada) before selling to the miller, increasing the value of the blended wheat.

The high protein content and protein quality of CWRS wheat is central to its global demand. CWRS with high protein content (>13%) is well-suited for baking pan breads and for blending purposes, whereas CWRS wheat with low protein content (<13%) is used alone or in blends for hearth breads, steamed noodles, flat breads, and related products (Lukow and Preston 1998). Low protein contents are not suitable for pan breads because of weaker dough strength, lower loaf volume and other panbread baking performance problems.

Durum wheat quality is also significantly and positively related to protein content. Generally, as protein content increases, semolina particle size becomes more consistent, hydration during dough mixing is more even, and cooked pasta becomes firmer, stronger, more elastic and less sticky. Such a product will swell adequately during cooking, will not leave much residue in the cooking water and will remain firm when kept in warm water after cooking and before it is served. Semolina from low protein durum will produce pasta products more or less deficient in some or all of these characteristics (Marchylo et al. 1998). The minimum protein content for high quality durum wheat destined for pasta production is generally 12 to 13%.

Therefore, protein contributes functional and economic value to wheat. However, those values vary substantially between the various classes of wheat grown in the Prairies.

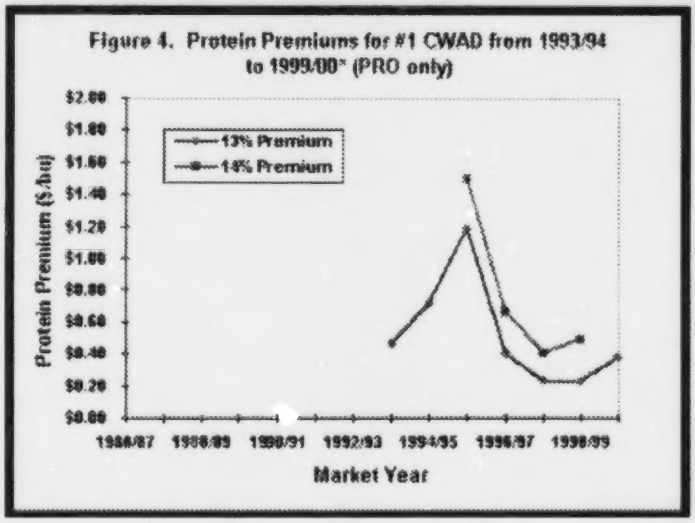
The Increasing Importance of Protein and Protein Premiums

Protein premiums paid to western Canadian farmers were high and generally increased in the 1990s compared with the 1980s, especially for CWRS. Figures 3 and 4 chart the premiums for CWRS and CWAD over the relevant #1 straight grade (i.e. no protein guarantee) from 1986/87 onward.

These charts indicate the premiums paid basis Vancouver and Thunder Bay (same price at both ports), the locations at which Canadian Wheat Board (CWB) payments are generally quoted. However, viewing the premiums at these locations slightly understates the increased importance of protein

premiums at the farm gate.

Transportation costs paid by farmers increased subsequent to the removal of the Crow Benefit on August 1, 1995. The typical freight rate paid by Saskatchewan farmers after this change was $16.32 per tonne higher ($0.44 per bushel). The protein premium is now a higher proportion of the farm gate price than it used to be. For example, the protein premium for 1CWRS 13.5 in 1998/99 was 14.8% of the typical farm gate price in Saskatchewan. If the Crow Benefit were still in place, the same protein premium would have been approximately 13.5% of the farm gate price. This change in transportation policy obviously has an impact, although changes in the the price of wheat have been more significant.



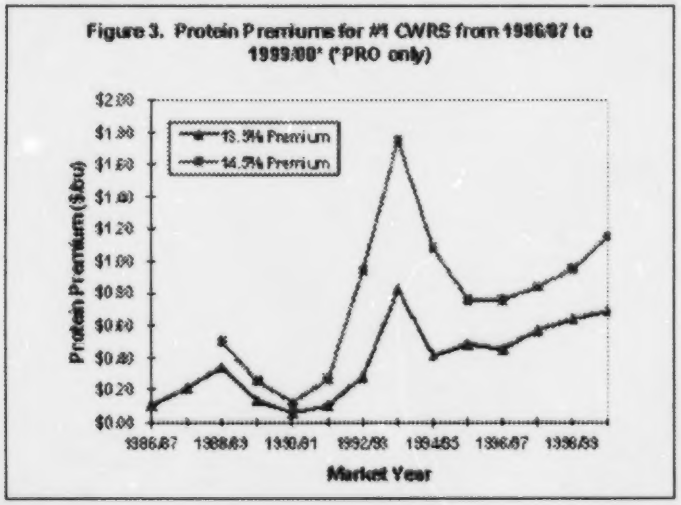


Figure 3. Protein Premiums for #1 CWRS from 1986/87 to 1999/00* (*PRO only)
13.5% Premium
14.5% Premium
Protein Premium ($/bu)
Market Year

Some factors are also working to limit the potential for very large increases in protein premiums. The Common Agriculture Policy (CAP) of the European Union (EU) has for some time created incentives for the increased use of vital wheat gluten as a substitute for high protein wheat. Because EU policy keeps

internal prices high for its locally-produced, mostly low-protein wheat, and keeps the price of imported wheat high, processors have improved their capability to process and use vital wheat gluten. These improved technologies are now available in other parts of the world and they can become economical to use if protein premiums rise too high. However, it is still relatively expensive to use gluten if high protein wheat is available at reasonable prices.

The CWB started making protein payments to farmers for CWRS wheat in 1978/79 and for CWAD wheat in 1993/94. The number of grades and the range of protein contents for which premiums have been paid have increased over the years (Tables 1 and 2).

Table 1. Protein payments for CWRS wheat from 1978/79 to 1999/00

Market Year(s)	Grades	Protein Range (%)	Increment (%)
1978/79-1979/80	1CWRS	>13.5	-
	2CWRS	>13.5	-
1980/81-1985/86	1CWRS	>13.5	-
1986/87-1993/94	1CWRS	13.5-14.5*	1.0
	2CWRS	>13.5	-
1994/95	1CWRS	13.0-14.5	0.5
	2CWRS	>13.5	-
1995/96	1CWRS	12.0-15.0	0.5
	2CWRS	12.0-15.0	0.5
1996/97-1998/99	1CWRS	12.0-15.0	0.5
	2CWRS	12.0-15.0	0.5
	3CWRS	>13.0	-
1999/00	1CWRS	12.0-15.0	0.1
	2CWRS	12.0-15.0	0.1
	3CWRS	>13.0	-

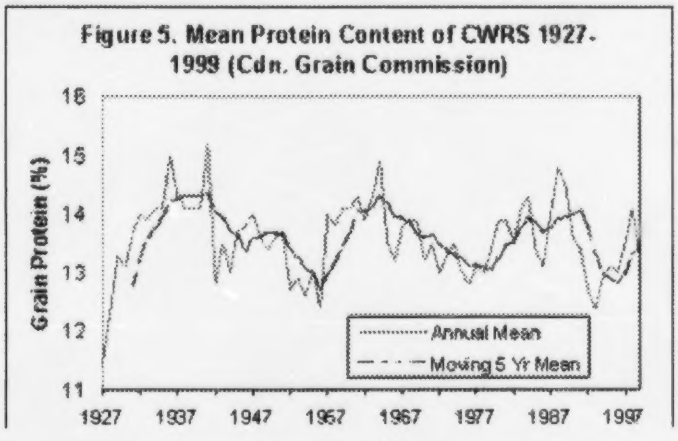
* except for 87/88 when >13.5% was the only protein payment

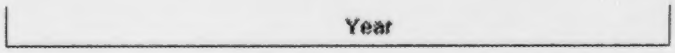
Table 2. Protein payments for CWAD wheat from 1993/94 to 1999/00

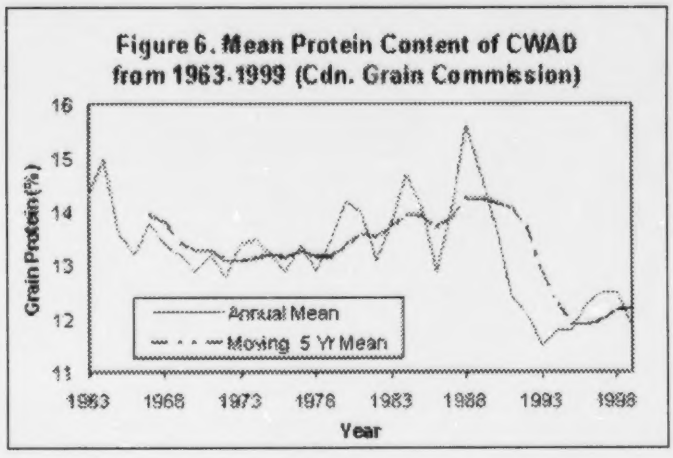
Market Year(s)	Grades	Protein Range (%)	Increment (%)
1993/94-1994/95	1CWAD	>13.0	-
	2CWAD	>13.0	-
1995/96	1CWAD	12.5-14.0	0.5
	2CWAD	12.5-14.0	0.5
1996/97-1998/99	1CWAD	12.5-14.0	0.5
	2CWAD	12.5-14.0	0.5
	3CWAD	>13.0	-
1999/00	1CWAD	12.5-14.0	0.1
	2CWAD	12.5-14.0	0.1
	3CWAD	>13.0	-

The CWB's system of paying protein premiums in finer increments starting August 1, 1999 has also had an impact on farm decisions. Previously, there was some risk that protein content might be increased to a point just under a particular payment level, for example to 13.4% when the next payment level is 13.5%. Now that payment is made for every 1/10 of 1% protein, that risk for farmers has been eliminated. As seen in Tables 1 and 2, protein premiums are currently paid in a range of 12.0% to 15.0% for grades 1 and 2 CWRS, and from 12.5% to 14.0% for CWAD. The CWB has recently proposed to the grain companies an expansion of the range for both classes to cover from 11.0% to 15.5% protein. The lowering of the bottom end would better reflect the value of very low protein relative to higher levels. The increase of the top end of the range would reduce the risk of overshooting the top of the range.

Figures 5 and 6 show the long term prairie average protein contents for CWRS and CWAD, based on the Canadian Grain Commission's annual harvest survey.







Even though varieties with genetic potential for higher protein have been released through time, since 1991 the CWRS prairie average protein content has been below the long term average of 13.6%, with the exception of 1998. The decline in CWAD protein in the 1990s was even more dramatic. CWAD protein content has been below its long term average of 13.3% since 1991, falling as low as 11.8% in 1994 and 1995 and to 11.9% in 1999. There are regional shifts as well. As previously noted, Manitoba's protein concentrations for CWRS wheat have generally been higher than those in Saskatchewan and Alberta during the last 25 years – a reversal of earlier history. This suggests that, in addition to the vagaries of weather (the 1990s have had more high moisture years than the 1980s, generally speaking), declining soil nitrogen reserves and N application in certain regions are partly responsible.

The decline in CWAD protein content has been particularly serious in terms of satisfying market demand. The problem is twofold. First, there have been difficulties caused in accumulating sufficiently large volumes of high protein CWAD for premium markets. Second, as noted previously, the minimum protein content for high quality durum wheat destined for pasta production is 12 to 13%. When the *average* CWAD protein content falls to levels as low as 11.9 % (1999), there can be considerable problems ensuring all shipments to quality markets meet minimum requirements in the range of 12.0%.

As a result of these trends, the CWB has placed more emphasis on examining whether efforts beyond providing appropriate price signals such as agronomic research and extension work need to be expanded. Many individual wheat farmers have also developed an interest in managing their crops for high protein content, in many ways treating high protein wheat as a high value specialty crop.

How the Market Determines Protein Premiums

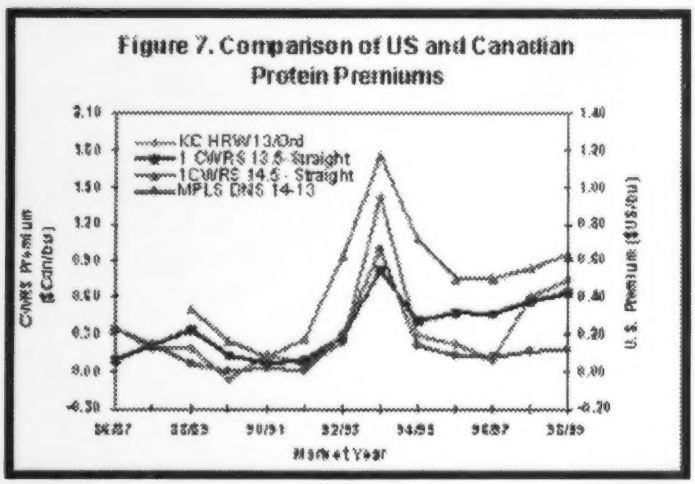
A. CWRS

Many factors work together to determine the value of protein in breadmaking wheat. Overall, however, the premiums are determined by the supply and demand of North American high quality, high protein wheat supplies. Milling demand is relatively stable from year to year, and millers need a minimum supply of high protein, high quality wheat. The production and quality of the U.S. Hard Red Winter (HRW) crop is the most important factor the market considers when evaluating premium potential, since HRW is the main constituent of U.S. flour. Low protein HRW crops result in a greater emphasis upon blending with high protein HRW and Hard Red Spring (HRS). A high protein HRW crop limits the demand for HRS, and in turn pressures premiums. Canada Western Extra Strong (CWES) wheat and industrial gluten can be used to strengthen flour as well.

Milling demand is satisfied by three main classes of wheat:

1. U.S. Hard Red Winter (HRW) – grown in the Southern Plains. Kansas (KS) production is the most critical, although Colorado, Nebraska, South Dakota, Texas, and Oklahoma are also important, particularly in years when KS quality or protein content (PC) is below normal.
2. U.S. Hard Red Spring (HRS) – grown in the Northern Plains in North Dakota (ND), South Dakota (SD), Montana and Minnesota. ND and SD production are most important to the milling industry. The top milling grade is Dark Northern Spring (DNS). HRS quality is especially important when HRW quality is below normal.
3. Canada Western Red Spring (CWRS)

Figure 7. Comparison of US and Canadian Protein Premiums



The price the U.S. milling industry is willing to pay for high protein, high quality wheat is the most important determinant of CWRS protein premiums. Export and domestic premiums are influenced by North American protein supply and demand factors to different degrees, but they follow a similar pattern. Minneapolis premiums reflect potential CWRS 13.5 protein premiums the most since HRS and CWRS are the most similar in quality. Figure 7 shows the close relationship between CWRS and U.S. protein premiums (please note that the chart is meant to show overall trends and not that 14% DNS or 13% HRW wheat is equivalent to 14.5% CWRS nor that the $1US was worth $1.50Cdn during the time period).

U.S. premiums are not the only determinant of CWRS premiums, since exports to the U.S. constitute only a small component of total CWRS exports. The size and quality of the Western Canadian crop helps to determine the course of the CWB's marketing plan. The CWB's customer base has changed considerably over time, and not all CWRS customers are willing to pay a premium for protein. Export competition for high quality markets varies considerably from year to year, depending on the export availability of major exporters' high quality wheat supplies (Australian, Canadian, and U.S.). In years when high protein wheat supplies are ample, competition increases and premiums are affected.

What Determines Protein Premiums?

The factors that determine protein premiums for a market year are revealed at different times during the annual production and marketing cycle (Table 3).

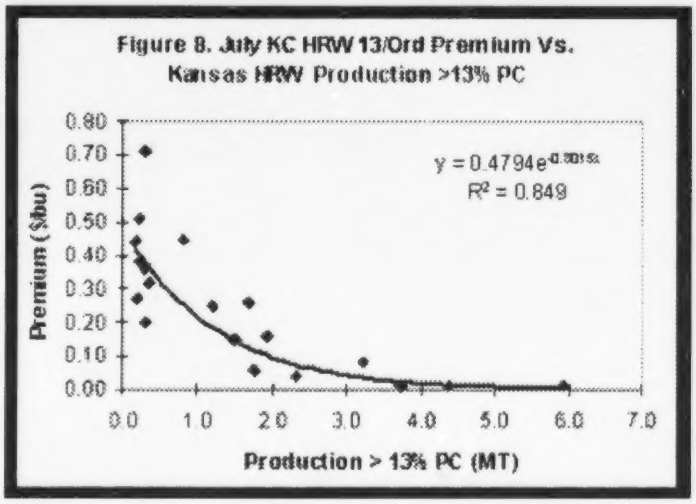
Table 3. Protein Premium Determination Timeline

Period	Key Events
January-April	U.S., Canadian carry-in supplies known
	HRW acreage known
	Spring wheat acreage determined
March	HRW crop breaking dormancy
April	Spring wheat seeding begins in U.S., W. Canada
May	HRW harvest begins in OK, TX
	HRW production, protein information clearer
June	Kansas harvest begins
	Spring wheat fusarium concerns develop
July	Kansas harvest ends; protein known
	Spring wheat production, fusarium damage clearer
August	Spring wheat harvest begins
	Australian seeding begins
September	HRS, CWRS quality evaluated
November	Australian harvest

Domestic premiums are determined between May and August, although the market has a sense for the potential magnitude of the premium based on the size and quality of the previous year's crop and carry-over. May is the period just prior to the availability of new crop HRW supplies, and uncertainty surrounds new crop HRW and HRS quality and quantity. Since old crop quality information is already well known to the market prior to new crop harvest, the *potential* for premiums is set prior to new crop harvest. New crop information reaches the market in two distinct phases that coincide with the HRS and HRW harvests. In years with high protein HRW, HRS information becomes less important to the market and premiums soften.

Winter wheat acreage estimates are formulated as early as September of the previous year when sowing begins. By the middle of May, the size and potential protein content (PC) of the HRW crop becomes clearer. The market's idea of crop size is often incorrect prior to harvest, such as it was in 1997, 1998, and 1999. Harvest weather can quickly impact the market, even if

PC is expected to be average to above average. The main KS harvest begins by mid-June, and protein data hits the market by month's end. Harvesting in more northerly and westerly areas of the HRW region begins by early July. In low protein years, the protein profile of the HRW crop in Nebraska, Colorado, the Texas Panhandle, and South Dakota becomes more critical, since high protein HRW supplies will be collected out of the area. If the HRW crop does not meet the needs of the milling industry, greater importance is placed upon a good quality HRS crop. In such a situation, opportunities for higher returns on CWRS protein increase. If the HRW crop returns high protein across most of the region, protein premium opportunities drop considerably (Figure 8).



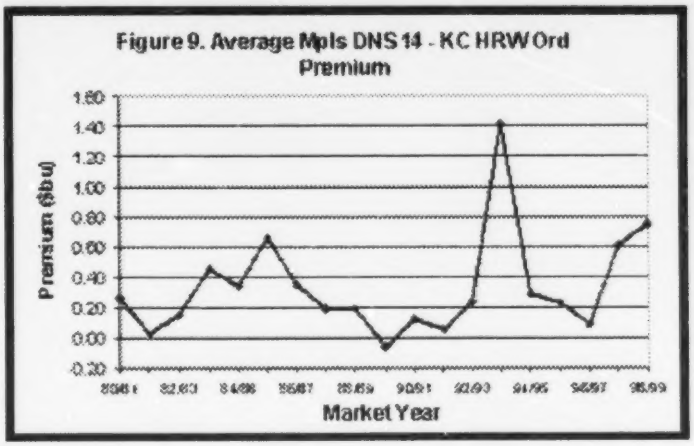
The market focuses on HRS prospects from June onwards; initial acreage surveys are available by early April. Quality concerns are at their peak from mid-June to mid-July when the potential for fusarium is highest. Since the early 1990's, concerns surrounding fusarium and its effect on end-use quality have grown substantially. Production and quality estimates become clearer by early August, and harvest results reach the market by mid-August once the South Dakota harvest begins. Harvest weather influences quality considerably. The milling industry focuses on quality in the Dakotas the most, since Montana HRS moves to the West Coast for the most part, and Minnesota quality is typically lower.

The Western Canadian harvest generally begins in the first half of August, while the Australian harvest wraps up by late November. The international market has a good sense of protein availability once the North American harvests are complete. The impact the Australian harvest has on international premiums varies from year to year.

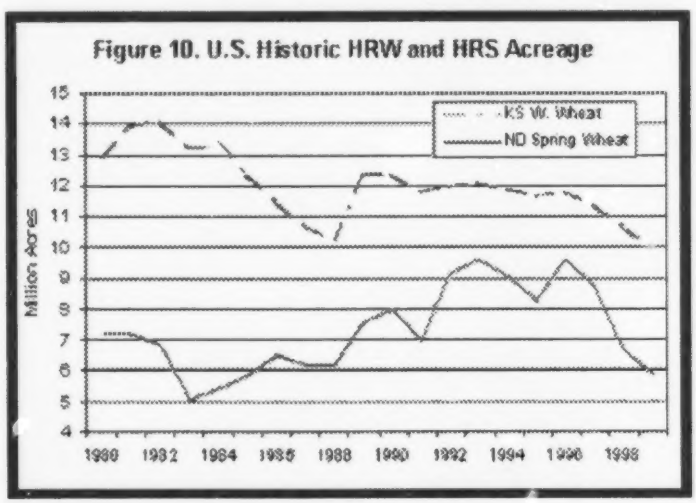
How Have Premium Fundamentals Changed Over the Past Ten Years?

The market has experienced substantial fundamental change since 1988/89 that has contributed to higher average HRS protein premiums. During most of the 1980s, premiums remained strong due to lower quality HRS crops along with low protein HRW crops (Figure 9). Acreage remained low until 1988 due to government set-aside programs and poor returns on wheat. The milling quality of varieties has also improved considerably over the past twenty years. Between 1988-90, premiums fell dramatically as drought boosted protein

levels and lowered production. Premiums strengthened in the early 1990s and have remained strong due to shrinking acreage, lower HRS quality on account of fusarium, and lower protein HRW crops. The following discussion follows the build-up in protein premiums from the lows of the late 1980s to the present.

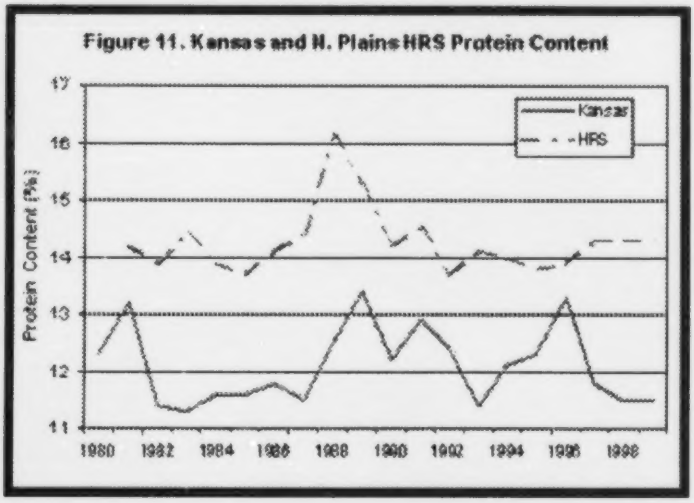


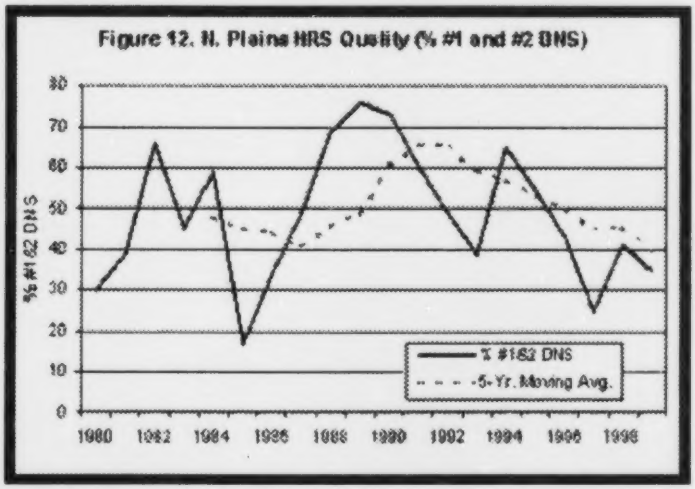
KS winter wheat and North Dakota (ND) spring wheat acreage can be used as a proxy for the potential domestic HRW and HRS milling wheat acreage base. Since 1989, combined ND and KS acreage has fallen 20.5 per cent (Figure 10). KS producers have shifted production into corn and soybeans in eastern and northern areas, while ND producers have shifted production away from cereals and into oilseed, row crops, and special crops, especially after fusarium problems developed in the early 1990's. Durum production has been all but pushed out of the Red River Valley due to fusarium problems. Wheat returns have been poor in both regions relative to other crops over the past few years, prompting a more rapid acreage decline.



KS PC and protein profiles have fallen over the past ten years (Figure11). KS PC has fallen from 12.5 per cent (1987-89) to 11.6 per cent. KS PC has been 11.8 per cent or lower over the past three years. The percentage of the KS crop with 13 per cent PC or higher is a good measure of the availability of high

protein HRW supplies. The profile has fallen from 34.3 per cent in 1987-89 to only 5.8 per cent in 1997-99. Compounding problems over the past two years have been low protein crops in Nebraska, Colorado, and the Texas Panhandle. ND PC is typically not an issue, since the moving average has hovered around 14 per cent. Grade patterns and fusarium damage impact North Dakota HRS quality more so. ND quality has been hurt significantly since the outbreak of fusarium in the early 1990's (Figure 12). Only 34 per cent of the Northern Plains HRS crop graded either #1 or #2 Dark Northern Spring (DNS) between 1997-99, compared to 65 per cent between 1987-89.



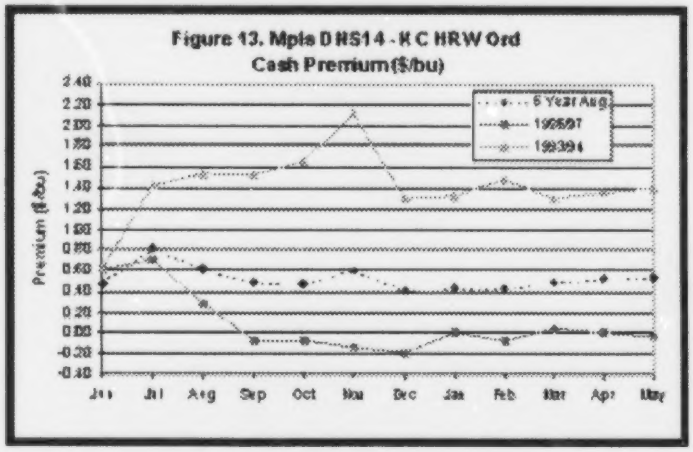


Although recent history has enhanced the potential for higher protein premiums, harvest results dictate where premiums end up. For example, despite knowing HRW acreage will be low and HRW carry-in stocks have a low PC, dry weather in the HRW region results in lower premiums since dependence on HRS drops.

The following discussion traces premium development though 1993/94 (a market year with high protein premiums) and 1996/97 (a market year with low protein premiums), using the Minneapolis DNS 14/KC HRW Ordinary

cash premium (Figure 13).

In 1993/94, premiums averaged USD 1.42 per bushel, and the premium for 1CWRS 14.5/Straight Grade was CDN 1.75 per bushel, the highest on record. U.S. carry-in stocks were 537 million bushels (14.6 million tonnes), the second lowest since 1974/75. In 1992, 26 per cent of the KS HRW crop was 13 per cent PC or higher (the lowest level since 1988/89), and the average PC was 12.4 per cent. ND production reached a record 382 million bushels (10.4 million tonnes), and PC averaged 13.7 per cent, the lowest level since 1980.



The 1993 KS crop was less than ideal from a miller's standpoint. PC averaged 11.4 per cent and only 2 per cent of the crop was 13 per cent PC or higher, the lowest levels since 1983. The DNS 14/HRWOrd premium rose from USD 0.81 per bushel in June to USD 1.35 in July. Compounding the increase was the realization that fusarium was a serious problem in ND. The proportion of the Northern Plains crop grading #1 or #2 DNS was only 49 per cent, the lowest level since 1988. The grade profile was more seriously compromised in the Dakotas and Minnesota. Since the industry, from producer to end user, was unaware of means of handling fusarium damaged wheat, problems with low HRW PC were compounded by a lack of clean HRS. Premiums peaked in September at USD 2.00 per bushel, and remained above USD 1.00 per bushel until May 1994.

The extremely high premiums in 1993/94 were an exception, since both the HRW and HRS crops had serious problems with end use quality. As mentioned previously, harvest dynamics can quickly soften premiums. Such was the case in 1996/97. KS' three-year moving average PC averaged 11.9 per cent between 1993-95. Only 21.6 per cent of the crop during this period was 13.0 per cent PC or higher, the second lowest level since the 1986-88 period. KS only produced 286 million bushels of wheat in 1995, versus 433 and 389 million bushels in the previous two years. Since the 1993/94 season, the ND crop experienced significant fusarium problems. The 1996 harvest turned premiums lower. By April the market had a good idea that the HRW crop would be of high protein. In 1996 the KS crop averaged 13.3 per cent PC, the highest since the HRW drought of 1989. Almost 54 per cent of the crop was at least 13 per cent PC or higher. Dry conditions pushed KS PC to 13.3 per cent in 1996, the highest level since 1989. Fifty-four per cent of the crop was at least 13.0 per cent PC, and lower-yielding, higher protein crops across the HRW region added to high protein supplies, meaning less emphasis was

needed on HRS quality. Only 25 per cent of the Northern Plains crop graded #1 or #2 DNS, the lowest since 1985. Poor test weight on account of dryness was the main degrading factor. PC only averaged 13.9 per cent. High quality HRS supplies were limited. A low protein HRW crop would have resulted in high premiums had the HRS crop turned out the same. The premium fell from USD 0.70 per bushel in June to USD -0.07 per bushel by September. CWRS 14.5/Straight Grade premiums still averaged USD 0.80 per bushel in 1996/97, but were nowhere near the levels achieved during 1993/94 and 1994/95.

U.S. fundamentals can explain only so much about the premium received by Western Canadian producers for CWRS. U.S. premiums only account for a portion of the end result, since the returns to the pool determine the final value of protein. Year to year variation in the size and quality of the Western Canadian crop have a large bearing on final values, as well as the customer mix from year to year.

B. CWAD

The international durum market is extremely volatile. In North Africa, the most important durum importing region in the world, production changes radically from year to year due to erratic weather. Canada and the U.S. are the two most important durum exporters in the world; Australia's influence is increasing as production increases. Quality in all three countries is extremely dependent on harvest weather, and high quality supplies vary considerably from year to year. Acreage swings considerably depending on price outlook. Turkey, Syria, and Mexico are minor exporters; their influence on the market depends much more on their export availability rather than quality. The base price and protein premium for CWAD is much less consistent on a yearly basis relative to CWRS, since supply and demand is in the hands of only a few countries. Unfortunately, for durum there are no relevant comparisons of futures markets to examine in the spring to determine potential protein premiums. The Minneapolis Grain Exchange offers a durum futures price but it cannot be compared with another higher or lower protein market (i.e. like comparing DNS and HRW futures for common wheat) in order to deduce probable protein premiums.

Predicting Protein Premiums

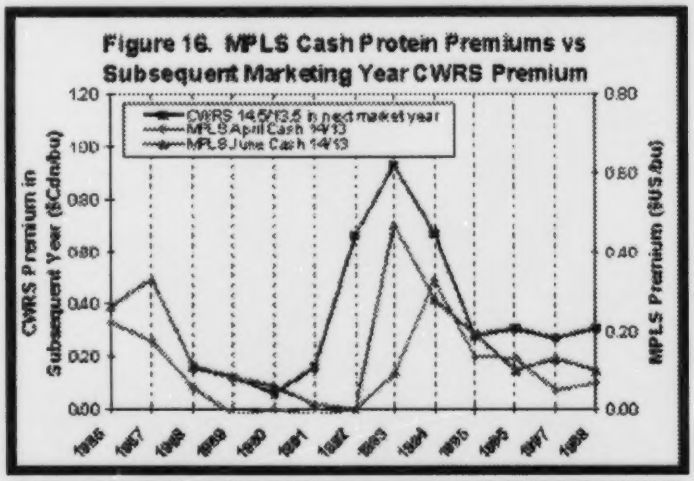
Market signals that would provide an early indication of the approximate value of the protein premium could help farmers to plan their agronomic management program for wheat. A protein premium forecast in March or April, estimated on the basis of the forecast of the world's winter wheat crop, for example, could help Prairie Canadian farmers to decide on an appropriate rate of preplant nitrogen fertilizer for their spring wheat crops. Another protein premium forecast in June (estimated on the basis of the world harvest of winter wheat) could be combined with knowledge of local early season growing conditions to help Prairie wheat growers to decide whether to add supplemental, midseason nitrogen.

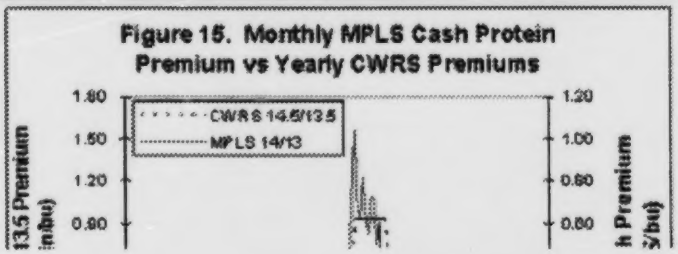
Protein premiums vary substantially from one year to the next and are difficult to predict accurately (please refer to the previous section and Przednowek et al. 1998). As was discussed in the previous section of this paper, weather and other crop conditions for the North American wheat crops play a large role in

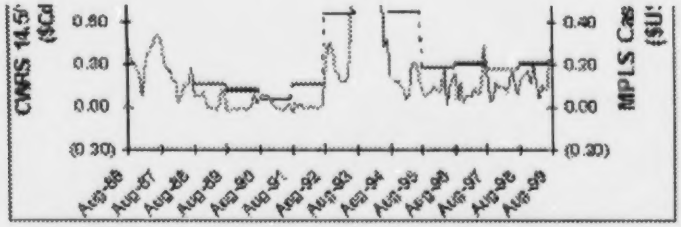
determining the supply and demand relationship for protein. Premiums are developed in response to the quantity of high quality and high protein wheat that is produced and are only revealed in the market as a cash premium; there are no futures markets or forward pricing mechanisms that can be used directly to forecast or "lock in" protein premiums.

Some market analysts have proposed that the spread between the Minneapolis DNS futures (with a minimum protein specification of 13%) and the Kansas City HRW futures (with no minimum protein specification) may be a useful predictor of protein premiums. However, the futures spread as of April or June for December delivery is not a reliable predictor of CWRS protein premiums in most years (Figure 14). Furthermore, the MPLS futures contracts have frequently traded at values less than their KC counterparts, illustrating that the MPLS-KC futures spread is affected by many factors other than protein specification.

Cash protein premiums in U.S. markets such as for Minneapolis DNS wheat are volatile (Figure 15), but their mean values often reflect trends in protein premiums paid for CWRS wheat (Figures 7 and 15; please note that these charts are meant to show overall trends and not that 14% DNS wheat is equivalent to 14.5% CWRS nor that the $1US was worth $1.50Cdn during the time period indicated). Therefore, some Canadian producers have attempted to use these cash values in spring and summer as an indicator of trends for new crop protein premiums. However, in April, the Minneapolis DNS cash premiums appear to reflect the market's perspective on the previous year's crop, not the new crop (Figure 16). As of June the cash premiums may start to reflect the market's perspective on the HRW crop being harvested and perhaps, a small amount of knowledge of the growing spring wheat crop. However, these early season trends do not accurately predict the absolute value of CWRS premiums in the subsequent marketing year.







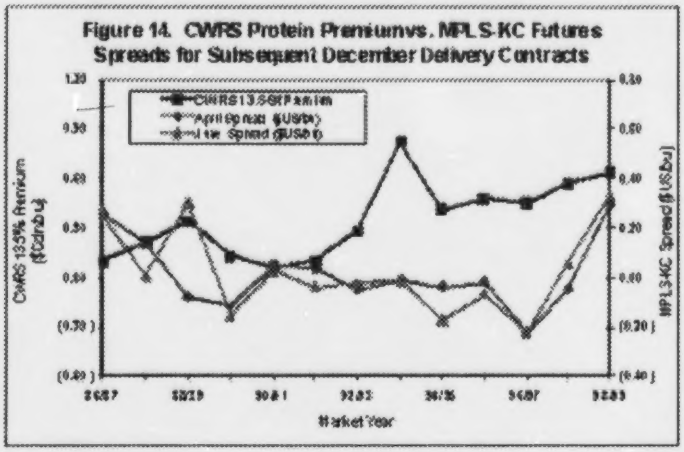


Figure 14. CWRS Protein Premiumvs. MPLS-KC Futures Spreads for Subsequent December Delivery Contracts
CWRS13.5%Premium
April spread ($US/bu)
July Spread ($US/bu)
CWRS 13.5% Premium ($Can/bu)
MPLS-KC Spread ($US/bu)
Market Year

Therefore, even with the best market information available, everyone in the wheat production, marketing and processing system (producers, buyers, millers, bakers) must make protein-related decisions based on imperfect information. As a result, producers must determine fertilization rates without precise information about base prices and protein premiums for the new crop.

Despite the uncertainties of predicting protein premiums, the CWB provides to farmers its best estimate of wheat prices and protein premiums through its "Pool Return Outlook" or PRO. The PRO estimate is published monthly by the CWB, announced on farm radio and newspapers, and posted in country elevators. The first PRO estimate, including preliminary estimates of protein premiums for CWRS and CWAD, is published in early March, when Western Canadian farmers may choose to use the information to assist in their planting decisions. Thereafter, the PRO is published every fourth Thursday of the month. By March the following year, the PRO range becomes an "Estimate of Pool Returns" or EPR for old crop production, and a new PRO is published to reflect the PRO for the coming new crop.

The first step to developing the PRO estimates is to gather information about weather, grain sales and markets. As mentioned in the previous section, crop production analysis based on weather developments is critical for determining the value of protein premiums. Crop failures or bumper crops can have a significant impact on volume and protein content of wheat. When global supply and demand for high quality wheat are tight, weather problems can result in wide price volatility. Up to date production, grade and protein estimates of Canadian crops as well as crops grown by major exporters and importers influence supply and demand analysis and price projections. The CWB's market analysts combine production estimates with current supplies in order to forecast import demand by country and estimate ending stocks globally and for individual exporting countries. From this information, a price forecast is developed for more than 30 indicator prices, including forecasts of

export subsidies used by competitors. In addition, the CWB's estimate also includes knowledge of its own sales to date, expected sales, remaining supplies to be sold, and the CWB's own analysis of weather impacts and market factors. With every PRO announcement, the CWB shares its comments about significant market factors.

The final step is to combine the forecast of price indicators with CWB information about anticipated Western Canadian supplies, firm sales and sales values, expected sales by class, grade, protein and market, forecasted foreign exchange rates, and estimated marketing costs. Delivery contracts help the CWB more accurately project available supplies by providing information about the quantity and quality of grain that farmers have signed up under contract. As the crop year progresses and CWB sales are concluded, a larger portion of grain in each pool account is priced. This provides more information to add to the PRO analysis. The PRO price range will narrow because changes in future sales values have a smaller impact on final pool returns.

Figures 17 and 18 display the PRO predictions of protein premiums for CWRS and CWAD for the 1998/99 and 1999/00 crop years respectively. Before 1998/99, protein premiums were not included in the PRO prior to September of each year. In 1998/99 the premium for 1CWRS 13.5 was projected in April at 68 cents/bu and in June at 76 cents/bu. The actual final premium in that year was 64 cents/bu. In the same year, the 1CWAD 13.0 premium was projected at 22 cents/bu in both April and June, with the final realized value turning out to be 23 cents/bu. The protein premium projections for 1999/00 have come down slightly for 1CWRS 13.5 and have risen quite significantly for 1CWAD 13.0. The crop year has not yet been completed.

This limited history of PRO protein estimation makes it difficult to assess the accuracy of this information source. This will have to be monitored over time.

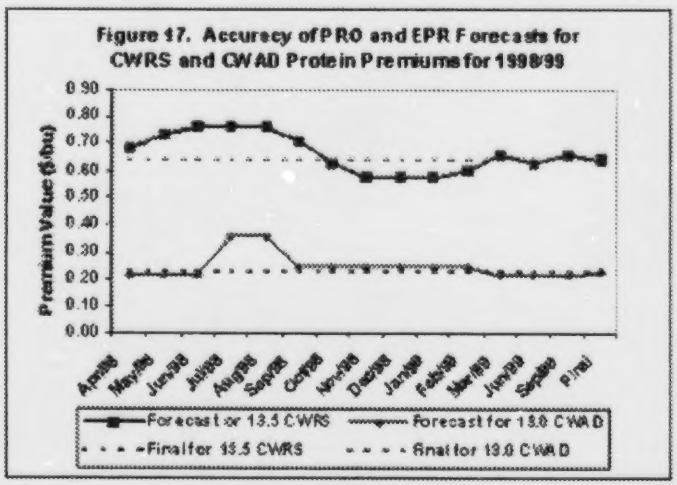
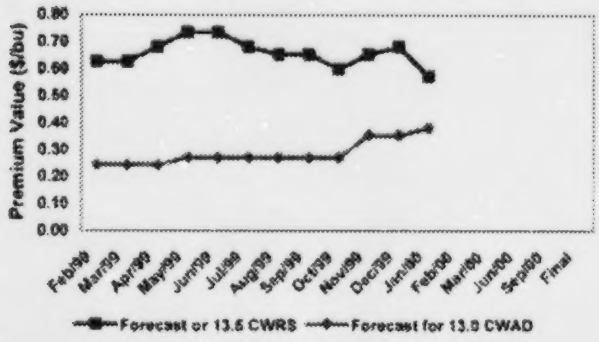


Figure 18. Accuracy of PRO and EPR Forecasts for CWRS and CWAD Protein Premiums for 1999/00



Protein Premium Prediction Options for Farmers

As is clear from the preceding discussion, the exact value of future protein premiums for wheat cannot be predicted prior to planting and fertilizing a wheat crop. In addition to the complications of examining factors such as the state of HRW, HRS or other world wheat crops when planting CWRS, farmers don't know how their Canadian neighbours will use the same information, which could affect CWRS protein supply. Information for CWAD is even less readily available, and the impact of Canadian CWAD protein will have an even greater relative impact on world durum markets than CWRS has on common wheat markets.

However, fertilization decisions – and therefore assumptions about future protein premiums - need to be made. One of the first logical steps is to estimate the relationship between nitrogen application levels and probable yield and protein responses in one's own region or even a particular field – a difficult enough task by itself! The following offers some options for deciding what protein premiums to assume that can be added to the equation:

Use Historical Ranges

One option – the only real option available for agronomic decisions that must be made in the fall, prior to planting the crop - is to examine recent history to determine the range of premiums that are possible. For example, from 1993/94 to 1998/99, the protein premium for 1CWRS 13.5 ranged from 40 to 82 cents per bushel and averaged 56 cents. One could assume the following year will again be average. Or, if one has a strong tendency to avoid risk of placing too much fertilizer, some level between the minimum and average of the range could be used.

Use the CWB PRO

In April or May, immediately prior to planting their crop, wheat producers can use the same historical information that could be used the fall before

and/or they may use PRO forecasts, provided by the CWB.

Calculate Your Own PRO

As mentioned previously, there are a large number of factors that could be examined to help predict protein premiums. Many of the factors that help the CWB determine the PRO are readily available to all market watchers, including wheat producers – cash market values, weather reports, crop estimates, or reported competitors' sales, etc. Therefore, also in April or May, producers could explore other sources of production and market information, doing their own analysis, basically replicating what the Canadian Wheat Board does to develop the PRO. In this way, producers could decide to use a projection that is higher or lower than the CWB's PRO.

For midseason fertilization decisions in June or early July, producers can use the same information as in April or May, except that the information is becoming more reliable, as the size and quality of the U.S. winter and spring wheat crops becomes more apparent.

Sources of Information

Both historical CWB prices and current PROs are available on the CWB web site at www.cwb.ca. Those who wish to can be added to an automatic updater service which sends messages by email when the web site has new information added. PROs are normally available in local newspapers and in country elevator offices. The same information can be obtained by calling the CWB's toll free number at 1-800-ASK4CWB, or by calling the CWB's "Fax on Demand" service at 1-800-665-8751.

In addition to CWB PROs and historical prices, there are many sources of information available to do the above analysis. The following lists several web sites for access to current information.

1) U.S. Crop Information:

a) National Agricultural Statistical Service http://www.usda.gov/nass/

(NASS also contains links to crop progress reports, state level crop reports, etc)

b) Kansas Wheat Commission: http://www.kswheat.com/index.html

(weekly harvest reports)

c) North Dakota Wheat Commission: http://www.ndwheat.com/

d) U.S. Wheat Associates: http://www.uswheat.org/

(weekly harvest reports)

2) Price Information:

a) USDA Economic Research Service	http://www.econ.ag.gov/
b) Minneapolis Daily Cash Grain Report:	http://www.ams.usda.gov/mnreports/MS_GR110.txt
c) Minneapolis Weekly Grain Summary:	http://www.ams.usda.gov/mnreports/MS_GR115.txt
d) Kansas City Daily Wheat Bids	http://www.ams.usda.gov/mnreports/SJ_GR110.txt
e) Minneapolis Grain Exchange:	http://www.mgex.com/
f) Chicago Board of Trade:	http://www.cbot.com/

Various provincial government and private services also offer much of this information.

Additional Information Requirements

There could be considerable useful additions made to the current inventory of protein premium information and how to use it. The first pieces relate to the relationship between nitrogen application levels and probable yield and protein responses in each relevant region or even for particular fields. These production functions are critical to using protein premium information effectively. They should also indicate how accurate the protein premium predictions need to be. That is, if a premium projection of plus or minus 10 cents per bushel isn't going to significantly affect N application rates, there isn't a need to worry about that level of accuracy.

A longer history of PRO protein premium predictions is also necessary to evaluate the effectiveness of that particular source of information. In addition, individuals will likely want to evaluate for themselves the predictive ability of various other sources of information.

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Introduction

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